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(54) Checkout apparatus.

(57) A checkout apparatus includes a first checkout lane (2A) having a reading section (10A) for reading article codes of articles, and conveyors (20A, 30A, 40A, 50A, 60A) for receiving the articles whose codes have been read by the reading section (10A), and a settlement section (70) for performing a first settlement process on the article codes read by the reading section (10A) of the first checkout lan (2A). Particularly, the checkout apparatus further includ s a second checkout lane (2B) having a reading sec-tion (10B) for reading article codes of articles, and conveyors (20B, 30B, 40B, 50B, 60B) for receiving the articles whose codes have been read by the reading section (10B) of the second checkout lane (2B). The settlement section (70) is disposed be-tween the first and second checkout lanes (2A, 2B), and provided for commonly performing the first set-tlement process and a second settlement process on the article cod s read by the reading section (10B) of the second checkout lane (2B).
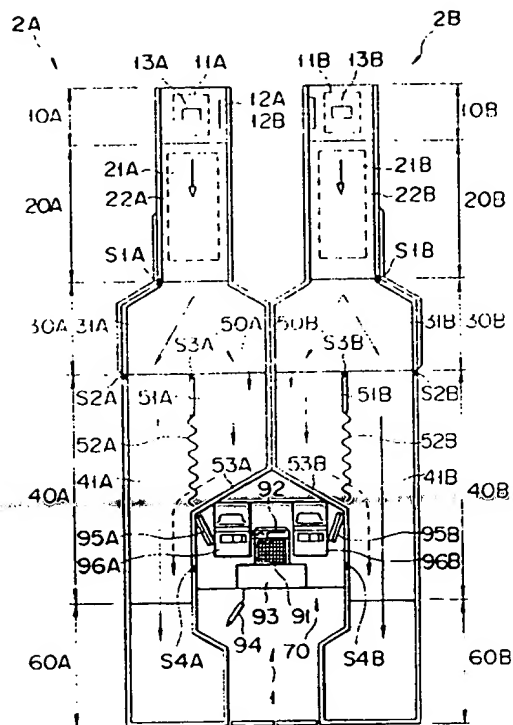
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This invention relates to a checkout apparatus for checking sales articles, and more particularly to a checkout apparatus used in a large-scale store such as a supermarket.

Conventionally, when a customer has brought a shopping basket containing articles which are not yet registered for sales in front of the scanner, the operator takes out the non-registered article from the shopping basket, uses the scanner to read the bar code representing the article code assigned to the article and then puts the article into an empty shopping basket set behind the scanner. After the operator settles the account when all of the non-registered articles have been registered into the cash register, the operator puts another empty basket behind the scanner. The customer brings the shopping basket containing the registered articles to the packaging table and puts the articles into a packaging bag.

However, the operator may have the following problems: A1) Since it is necessary to take out the articles one at a time from the shopping basket in which a large number of non-registered articles are packed at random, it is difficult to take out them from the basket, and particularly, when fragile articles are received in the basket, it becomes further difficult to rapidly take out them. A2) Since it is necessary to put the articles which have been taken out from the shopping basket into another shopping basket in such an order that the fragile articles may be put on other articles which are difficult to be damaged, it is difficult to rapidly deal with the articles. A3) It is required to set an empty shopping basket behind the scanner for the next customer.

Further, the customer may have the following problems: B1) The waiting time becomes long because the operator has the above problems. B2) It is necessary to take the heavy shopping basket containing registered articles to the packaging table after the settlement. B3) Since it is necessary to take out the registered articles from the shopping basket on the packaging table and then put the fragile articles on the other articles which are not fragile into a packaging bag, it takes a long time for packaging.

In order to solve the above problems, a checkout apparatus disclosed in Japanese Patent Disclosure No. 61-46591 has been proposed. The checkout apparatus includes a reader (or scanner) which is used by the customer to read the bar code of an article, a feed conveyor for feeding the article whose bar code is read by the reader, a weight measuring device for measuring th weight of an article set on the feed conv yor, a feed-out conveyor disposed continuously to the r ar end of the feed conveyor, for feeding the article whose w ight is m asured, a packaging section disposed

at the end portion of the feed-out conveyor, and a settlement section at which the customer having packaged the articles at the packaging section settles the accounts.

Therefore, when the customer has come to the checkout position after having put articles to be purchased into a shopping cart, he takes out the articles one at a time from the shopping cart, reads the bar code of the article by use of the reader, and then puts it on the feed conveyor.

When the bar code of the article is correctly read by the reader, the checkout apparatus reads out weight data corresponding to a code input from the reader from a memory which stores weight data of transaction articles classified by the article codes and compares the readout weight data with the weight data of the article which is set on the feed conveyor and whose weight is measured by the measuring device.

In this case, if the compared weight data items are coincident with each other, it is determined that the article whose article code is read by the reader is the same as that which is being fed and the article is fed to the packaging section by driving the feed conveyor and feed-out conveyor in a forward direction.

If the compared weight data items are not coincident with each other, the article is returned to the reader by driving the feed conveyor and feed-out conveyor in a reverse direction. The customer again operates the reader to read the bar code of the article which has been returned to the reader.

Therefore, in a case where the bar code cannot be read by means of the reader (including a case wherein the customer directly sets the article onto the feed conveyor without effecting the bar code reading operation), or in a case where the customer sets an article different from the article whose bar code is read by use of the reader on the feed conveyor, the article is returned to the reader and therefore erroneous registration and a dishonest act of the customer can be prevented.

In a case where the customer operates the reader to read the bar code attached to an article, it frequently occurs that the bar code cannot be correctly read because the customer is not used to the reading operation. Further, there is a possibility that the bar code cannot be correctly read because of stain on or breakage of the bar code label.

In this condition, the weight data of the article whose weight is measured by the measuring device does not coincide with the weight data read out from the memory and th article is returned to the reader. As a result, in this period of time, it becomes impossible to operate the reader so as to read the bar code of a next article.

In addition, even if the reading operation is effected again and when the bar code is not cor-

rectly read, the operator who is in charge of the settlement is called to come to the position of the reader and the operator cannot concentrate all his energy on the settlement operation

In a supermarket, a plurality of the above-mentioned checkout apparatuses are employed to reduce the waiting time of customers as much as possible. However, long queues of customers are often formed at busy time. In order to cope with this problem, it can be thought to provide a larger space for installation of additional checkout apparatuses. This, however, results in a decrease in space for displaying articles for sale. At times the supermarket is not crowded, some of the checkout apparatuses are stopped, and the cashiers leave the apparatuses. That is, the number of cashiers varies depending on time zones.

An object of the present invention is to provide a compact checkout apparatus in which the number of cashiers and the waiting time of customers is less affected by a variable number of customers depending on time zones.

This object can be attained by a checkout apparatus which comprises: first and second checkout lanes each having a reading section for reading article codes of articles, and an article receiving section for receiving the articles whose codes have been read by the reading section; and a single settlement section, disposed between the first and second checkout lanes, for commonly performing a first settlement process on the article codes read by the reading section of the first checkout lane and a second settlement process on the article codes read by the reading section of the second checkout lanes.

According to the checkout apparatus of the present invention, the settlement section is provided commonly for the two checkout lanes. The operator (i.e., cashier) waits for completion of reading of article codes performed on the first and second lanes, and instructs the settlement section to effect settlement for the customer who has completed the reading of all article codes. The space for installation of this checkout apparatus is smaller than in the case where two checkout apparatuses each having a single checkout lane and a single settlement section for the checkout lane. Accordingly, a greater number of checkout apparatuses can be installed in a limited space, and therefore the settling ability per unit area of the floor can be nhanced and the waiting time of customers can be decreased. Furthermore, it is not necessary to increase the number of cashiers at the time the supermarket is crowded. With a relatively small number of cashiers, the problem of variation in number of customers can be coped with.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a plan view of a checkout apparatus according to a first embodiment of the present invention;

Fig. 2 is a perspective view of the checkout apparatus;

Fig. 3 is a view showing the construction of an operation panel shown in Fig. 1;

Fig. 4 is a block diagram showing the circuit of the checkout apparatus;

Fig. 5 is a block diagram showing the circuit of a POS terminal shown in Fig. 4;

Fig. 6 is a memory map of an article data file stored in a RAM shown in Fig. 5;

Fig. 7 is a plan view of a checkout apparatus according to a second embodiment of the present invention which is similar to the first embodiment;

Fig. 8 is a memory map of an article data file stored in a RAM of the second embodiment which is similar to that shown in Fig. 5;

Fig. 9 is a memory map of an read article file stored in the RAM of the second embodiment, together with the article data file shown in Fig. 8; and

Figs 10 to 12 show flowcharts for explaining the operation of the checkout apparatus of the second embodiment.

There will now be described a checkout apparatus according to a first embodiment of this invention with reference to Figs. 1 to 6.

Fig. 1 is a plan view of the checkout apparatus and Fig. 2 is a perspective view of the apparatus. The checkout apparatus is constituted by two checkout lanes 2A and 2B disposed in parallel on both sides of a settlement section 1.

A POS (point of sales) terminal 70 is arranged on the settlement section 1. The checkout lanes 2A and 2B are respectively constituted by reading sections 10A and 10B, feed-in sections 20A and 20B, distributing sections 30A and 30B, feed-out sections 40A and 40B, stock sections 50A and 50B serving as stocking means, and packaging sections 60A and 60B.

The reading sections 10A and 10B respectively include operation panels 12A and 12B and scanners 11A and 11B serving as reading means for reading bar codes representing article codes of articles. The scanners 11A and 11B have horizontal windows 13A and 13B, and each of the scanners scans a laser beam on an area above the scanner via a corresponding one of the reading windows 13A and 13B and reads a bar code by receiving light reflected from the bar code of an article moving across the area. Further, as shown in Fig. 3, display units 14A and 14B, start switches 15A and 15B, stop switches 16A and 16B, and call switches

17A and 17B for calling the operator are disposed on the operation panels 12A and 12B.

Feed-in conveyors 21A and 21B serving as feeding means for feeding articles which have been subjected to the reading operation in the scanners 11A and 11B to the distributing sections 30A and 30B and weighing scales 22A and 22B for measuring the weight of articles disposed on the feed-in conveyors 21A and 21B are respectively disposed in the reading sections 20A and 20B.

The distributing sections 30A and 30B include distributing conveyors 31A and 31B serving as distributing means and each including first and second roller units intersecting each other. The first roller unit has shafts extending in a second direction and rollers mounted on the shafts, and the second roller unit has shafts extending in the first direction and rollers mounted on the shafts. The first roller units of distributing sections 30A and 30b are driven to feed articles to the feed-out section 40A and 40B. The second roller units of the distributing sections 30A and 30B are driven to feed articles to the stock sections 50A and 50B. First sensors S1A and S1B for detecting that articles are moved from the feed-in conveyors 21A and 21B are disposed on the entrance portions of the distributing conveyors 31A and 31B. Second sensors S2A and S2B for detecting that articles are moved from the distributing conveyors 31A and 31B to the feed-out sections 40A and 40B and third sensors S3A and S3B for detecting that articles are moved from the distributing conveyors 31A and 31B to the stock sections 50A and 50B are disposed on the exit portions.

The feed-out sections 40A and 40B include f ed-out conveyors 41A and 41B serving as feed-out means for passing the articles distributed in the first direction by the distributing conveyors 31A and 31B through portions beside the settlement section 1 and further feeding the article to the packaging sections 60A and 60B. On the half-way of the feed-out conveyors 41A and 41B, that is, near the settlement section 1, fourth sensors S4A and S4B for detecting the presence or absence of th article are disposed.

The stock sections 50A and 50B are used to stock articles distributed in the second direction by the distributing conveyors 31A and 31B and disposed in parallel to and inside the feed-out conveyors 41A and 41B. Further, the stock sections 50A and 50B include stock conveyors 51A and 51B for feeding the articles distributed in the second direction by the distributing conv yors 31A and 31B to the front sides of the settlem nt section 1. At th end portions of th stock conveyors 51A and 51B, stopper walls 53A and 53B are disposed to guide articles to gates 52A and 52B. The gates 52A and 52B are disposed, at the boundari s between the

stock conveyors 51A and 51B and the feed-out conveyors 41A and 41B, to be freely moved in a vertical direction into an open and close state, as shown in Fig.2. The gates 52A and 52B is used to control the movement of articles to the feed-out conveyors 41A and 41B. The stocked articles is moved into the feed-out conveyors 41A and 41B when the gates 52A and 52B are set to the open state.

Fig. 4 shows the circuit construction of the checkout apparatus.

As shown in Fig. 4, the checkout apparatus comprises a POS terminal 70 connected to constituent elements of the checkout lane 2A, i.e., the scanner 11A, the operation panel 12A, the feed-in conveyors 21A, the weighing scale 22A, the distributing conveyor 31A, the feed-out conveyor 41A, the stock conveyor 51A, the gate 52A, and the sensor group SA (sensors S1A to S4A), and to constituent elements of the checkout lane 2B, i.e., the scanner 11B, the operation panel 12B, the feed-in conveyors 21B, the weighing scale 22B, the distributing conveyor 31B, the feed-out conveyor 41B, the stock conveyor 51B, the gate 52B, and the sensor group SB (the sensors S1B to S4B).

Fig. 5 shows the circuit construction of the POS terminal 70. The POS terminal includes a CPU 71, A ROM 73 storing a control program, a RAM 74 for storing registration data and the like, a keyboard controller 75, display controllers 76, 79 and 80, a drawer controller 77, a scanner interface 78, printer controllers 81 and 82, and interfaces 83 and 84 with respect to the respective constituent elements in the checkout lanes 2A and 2B are connected to the CPU 70 via an address data bus 72.

The RAM 74 has an area for storing registration data and an area for storing an article data file shown in Fig.6. The article data file is previously provided as a table for article data of articles dealt with in the store. Each item of article data includes an article code, an article name, a unit price, and weight data with respect to a corresponding article.

The keyboard controller 75 is connected to keyboard 91 which is operated by the operator, the display controller 76 is connected to an operator display unit 92, the drawer controller 77 is connected to a drawer 93, and the scanner interface 78 is connected to a touch scanner 94 which is operated by the operator to read the bar code of the article. Further, the display controllers 79 and 80 and printer controllers 81 and 82 are connected to customer display units 95A and 95B and printers 96A and 96B respectiv ly provided in th checkout lanes 2A and 2B.

The CPU 71 controls the above constituent elements based on the control program stored in th ROM 73. For example, when the scanner 11A

or 11B reads the bar code, weight data corresponding to the code thus read is read out from the article data file 85 and then the readout weight data is compared with weight data measured by the weighing scale 22A or 22B to determine whether or not the compared weight data items are coincident with each other. That is, the CPU 71 and ROM 73 constitute checking means for checking whether or not an article fed by the feed-in conveyor 21A or 21B coincides with an article whose article code is read by the scanner 11A or 11B The distributing conveyors 31A and 31B are controlled according to the comparison result to distribute the article in one of different directions.

Next, the operation of the checkout apparatus is explained.

When the customer comes to a position of the reading section 10A, for example, after having put articles to buy into the shopping cart, the customer operates the operation panel 12A according to the massages displayed on the display unit 14A. First, the start switch 15A is depressed. Then, the CPU 71 of the POS terminal 70 drives the conveyors 21A, 31A and 41A and then displays the massage "Please read bar codes" on the display unit 14A.

According to this massage, the customer takes out the articles one at a time from the shopping cart, passes the article along the scanner 11A with the bar code plane of the article set to face the reading window 13A, and then puts the article on the feed-in conveyor 21A. At this time, if the scanner 11A correctly reads the bar code, the CPU 71 reads out the article data of an article corresponding to the thus read bar code from the article data file 85 and checks whether or not the weight data included in the readout article data coincides with the weight data of an article which is set on the feed-in conveyor 41A by the customer and measured by the weighing scale 22A. If the scanner 11A cannot correctly read the bar code or when the customer directly sets the article on the feed-in conveyor 21A without effecting the reading operation, article data is not read out from the article data file 85.

In this case, if the compared weight data items are coincident with each other, the distributing conveyor 31A is controlled to feed the article on the distributing conveyor 31A to the feed-out conveyor 41A when the article on the feed-in conveyor 21A is moved onto the distributing conveyor 31A, that is, when the first sensor S1A is set from the ON state to the OFF state and the second and third sensors S2A and S3A ar not set in the ON state. When the article is fed to the feed-out conveyor 41A by means of the distributing conveyor 31A, the article is fed to pass by the settlement section 1 by means of the feed-out conveyor 41A and further fed to th packaging section 60A.

On the other hand, if the compared weight data items are not coincident with each other, that is, in a case where the scanner 11A cannot correctly read the bar code, where the customer directly sets the article on the feed-in conveyor 21A without effecting the reading operation, or where the customer sets an article which is different from an article which is subjected to the reading operation by use of the scanner 11A on the feed-in conveyor 21A, then the distributing conveyor 31A is controlled to feed the article on the distributing conveyor 31A to the stock conveyor 51A when the article on the feed-in conveyor 21A is moved onto the distributing conveyor 31A.

When the article is fed to the stock conveyor 51A by means of the distribution conveyor 31A, the third sensor S3A is turned on. Then, the CPU 71 drives the stock conveyor 51A for a preset period of time (which is longer than a period of time required for the article set on the stock conveyor 51A to reach the stopper wall 53A). As a result, the article is fed into between the stopper wall 53A and the gate 52A and stocked there.

If an article lies on the distributing conveyor 31A when an article on the feed-in conveyor 21A has reached the position of the first sensor S1A, the feed-in conveyor 21A is stopped until the article on the distributing conveyor 31A is fed out therefrom.

In this way, after the reading operation for all of the articles is completed, the customer depresses the stop switch 16A. Then, the CPU 71 stops the operation of the conveyors other than the stock conveyor 51A (i.e., the conveyors 21A, 31A and 34A). After this, the customer goes to the settlement section 1. The operator at the settlement section 1 settles the accounts of the articles registered for the customer.

At this time, the operator directly takes out an article stocked if the article is stocked in the stock section 50A and uses the touch scanner 94 to read the bar code of the article while confirming the customer's agreement, and then puts the article into the packaging section 50A. That is, the article is additionally registered.

If a large number of articles are stocked or if heavy articles are stocked and it is difficult to take out the article, the gate 52A is opened. Then, the CPU 71 drives the stock conveyor 51A and feed-out conveyor 41A and then stops the conveyors 51A and 41A when the fourth sensor S4A is turned on. As a result, an article stocked in the stock section 50A is fed from the stock conveyor 51A to the feed-out conveyor 41A and then stopped when it has reached a portion just beside the settlement section 1. Therefore, the operator takes up the article which has reached the portion just beside th settlement section 1 and uses the touch scan-

ner 94 to read the bar code of the article while confirming the customer's agreement and then puts the article into the packaging section 60A.

In the settlement, the printer 96A is driven to issue a receipt of the registered articles and the operator hands it over to the customer and receives money. After the settlement, the customer goes to the packaging section 60A and puts the articles into a packaging bag.

As described above, in this embodiment, weight data corresponding to an article whose the article code is read by the scanner 11A or 11B is compared with weight data measured by the weighing scale 22A or 22B and the article is fed into the feed-out conveyor 41A or 41B when the compared weight data items are coincident with each other, and the article is stocked in the stock section 50A or 50B when the compared weight data items are not coincident with each other. Therefore, even when the compared weight data items are not coincident with each other, the reading operation for the next article can be continuously effected, and thus the reading operation can be effected efficiently.

That is, even when the bar code cannot be correctly read because the customer is not accustomed to the reading operation or when the bar code cannot be read because the bar code is damaged or stained, the reading operation for the next article can be continuously effected so that the reading operation can be efficiently effected.

Further, since the stock sections 50A and 50B are arranged inside the feed-out conveyors 41A and 41B and the stock sections 50A and 50B are so arranged as to feed the article supplied thereto to the front portion of the settlement section 1 and stock the article there, the operator at the settlement section 1 can directly take out the article in th stock section 50A or 50B and additionally register the article.

If a large number of articles are stocked or heavy articles are stocked and it is difficult to take out the article, the operator can easily and additionally register the articles without moving from the settlement section 1 since the articles stocked in th stock sections 50A and 50B can be fed to portions just beside the settlement section 1 by opening the gates 52A and 52B and driving the stock conveyors 50A and 50B and the feed-out conveyors 41A and 41B. At this time, since the stock sections 50A and 50B are arranged inside the feed-out conveyors 41A and 41B of the checkout lanes 2A and 2B, the article which is fed from the stock section 50A or 50B to th feed-out conveyor 41A or 41B passes by the settlement section 1 and therefore the operator can take out the article from the feed-out conveyor 41A or 41B and additionally register the article.

For the additional registration, the bar code of the article is read by use of the touch scanner 94 so that the stocked article can also be easily and additionally registered. If the bar code cannot be read by use of the touch scanner 94 because of breakage of or stain on the bar code, it is possible to input data by key operation on the keyboard 91.

Further, since the checkout lanes 2A and 2B are arranged on both sides of the settlement section 1, the processings for the two lanes can be effected by one person at the settlement section 1. Therefore, the number of operators can be reduced.

In the above embodiment, the article stocked in the stock section 50A or 50B is fed to a portion just beside the settlement section 1 by driving the stock conveyor 51A or 51B and the feed-out conveyor 41A or 41B, but if the stock sections 50A and 50B are arranged near the settlement section 1, the operator at the settlement section 1 can directly take out the article stocked in the stock section 50A or 50B and additionally register the article irrespective of the number of articles and the weight thereof. Therefore, in this case, the gates 52A and 52B and the fourth sensors S4A and S4B can be omitted.

Further, in the above embodiment, the articles are distributed along the right and left paths in the feeding direction of the feed-in conveyors 21A and 21B by the distribution conveyors 31A and 31B, for example, it is possible to arrange the feed-in conveyors 21A and 21B and the feed-out conveyors 41A and 41B on straight lines, respectively, feed the article along the straight line on the feed-in conveyor 21A or 21B, the distribution conveyor 31A or 31B and the feed-out conveyor 41A or 41B when the comparison result indicates the coincidence of the compared weight data items, and change the feeding direction of the article by the distribution section 31A or 31B and feed the article to the stock conveyor 51A or 51B when the comparison result indicates the non-coincidence of the compared weight data items.

Next, a checkout apparatus according to a second embodiment of this invention is explained with reference to Figs. 7 to 12. The checkout apparatus is formed to have a construction similar to that of the former embodiment except the following points. Accordingly, detail explanation for the same portions is omitted. In the following explanation, the same portions are denoted by the same reference numerals used in the former embodiment.

In the second embodiment, feed-in conv yors 21A and 21B are r spectiv ly constituted by first feed-in conveyors 21A-1 and 21B-1 and second feed-in conv yors 21A-2 and 21B-2. Sensors S0A and S0B are respectively disposed between the first and second feed-in conveyors 21A-1 and 21A-

2 and between the first and second feed-in convey-
ors 21B-1 and 21B-2, and units for measuring
characteristic data inherent to the article on the
second feed-in conveyor, in this example, weight
measuring scales 22A and 22B serving as measur-
ing means for measuring weight of the article are
disposed on the side of the second feed-in convey-
ors 21A-2 and 21B-2, respectively.

The CPU 71 is connected to a timer TM for
generating present time data. The RAM 74 has an
area for storing registration data, an area for storing
an article data file shown in Fig.8, and an area for
storing a read article file 86 shown in Fig.9. The
article data file is previously provided as a table for
article data of articles dealt with in the store. Each
item of article data includes an article code, an
article name, a unit price, and weight data with
respect to a corresponding article. The read article
file is provided for each customer as a table for
article data of articles whose bar codes (or article
codes) are read by the scanner 11A or 11B. The
read article file 86 includes items of transaction
time data added to article data items of articles
whose article codes are read by the scanner 11A
or 11B. Each transaction time data indicates the
time at which the article code of a corresponding
article is read.

Further, the CPU 71 controls the above con-
stituent elements based on the program stored in
the ROM 73. For example, when the scanner 11A
or 11B reads the bar code, the CPU 71 executes
the process shown by the flowchart of Fig. 10.
Further, when weight data from the weighing scale
22A or 22B is changed, the CPU 71 executes the
process shown by the flowchart of Fig. 12. In this
example, the CPU 7 and the ROM 73 constitute
reading means for reading out article data of an
article corresponding to the article code from the
article data file 85 and storing the data into the
read article file 86 each time the article code is
read by the scanner 11A or 11B and checking
means for checking whether or not the same
w ight data as the weight data measured by the
weighing scale 22A or 22B is stored in the read
article file 86. The distribution conveyor 31A or 31B
is controlled to distribute the article in one of first
and second directions based on the checking re-
sult.

Now, the operation of the checkout apparatus
according to the second embodiment is explained
with reference to flowcharts of Figs. 10 to 12.

When the customer comes to a position of the
reading section 10A, for xample, after having put
articles to buy into the shopping cart, the customer
effects the operation according to the massage
displayed on the display unit 14A of the operation
panel 12A. First, the start switch 15A is depressed.
Then, the CPU 71 of the POS terminal 70 drives

the conveyors 21A, 31A and 41A and then displays
the massage "Please read bar codes" on the dis-
play unit 14A.

According to this message, the customer takes
out the articles one at a time from the shopping
cart, passes the article along the scanner 11A with
the bar code plane of the article set to face the
reading window 13A, and then sets the article on
the first feed-in conveyor 21A-1 At this time, the
CPU 71 searches the article data file 85 for article
data i.e., an article name, unit price and weight
data, corresponding to an input code as shown in
the flowchart of Fig. 10 when an article code is
input from the scanner 11A, and if the article data
is present therein, it stores the above data into the
read article file 86 together with transaction time
data.

If the scanner 11A cannot correctly read the
bar code or when the customer directly sets the
article on the feed-in conveyor 21A without effec-
ting the reading operation, corresponding article
data cannot be read out from the article data file 85
and therefore no article data is written into the read
article file 86. The CPU 71 executes the process
shown in the flowchart of Fig. 11 at a regular
interval. For example, the CPU 71 checks whether
or not data which is kept stored for a preset period
of time (which is longer than a period of time from
the reading time to the time at which the article has
reached the second feed-in conveyor 21A-2 or
21B-2 in the normal operation) among the transac-
tion or reading time data stored in the read article
file 86 is present, and when time-over data is
detected, the data is removed from the read article
file 86 along with a corresponding article data.

The article set on the first feed-in conveyor
21A-1 is fed from the first feed-in conveyor 21A-1
to the second feed-in conveyor 21A-2 and the
weight thereof is measured by the weighing scale
22A. Then, the CPU 71 searches the read article
file 86 for the same weight data as the weight data
from the weighing scale 22A to check whether or
not the same weight data is present therein as
shown in the flowchart of Fig. 12 when the article is
fed into the second feed-in conveyor 21A-2 and the
weight data of the weighing scale 22A is changed.

In this case, if the same weight data is present
in the read article file 86, registration is effected
based on the article data corresponding to the
weight data is registered and then the article data
is removed from the read article file 86 along with a
corresponding transaction time data. When the arti-
cle on the second feed-in conveyor 21A-2 is
moved onto the distribution conveyor 31A, that is,
when the first sensor S1A is set from the ON state
to the OFF state and the second and third sensors
S2A and S3A are not set in the ON state, the
distribution conveyor 31A is controlled to to f ed

the article on the distribution conveyor 31A to the feed-out conveyor 41A. When the article is fed to the feed-out conveyor 41A by the distribution conveyor 31A, the article passes beside the settlement section 1 and is fed to the packaging section 60A by the feed-out conveyor 41A.

In a case where the same weight data is not stored in the read article file 86, that is, in a case where the bar code cannot be correctly read by means of the scanner 11A, where the customer directly sets the article on the feed-in conveyor 21A without effecting the reading operation, or where the customer sets an article different from the article whose bar code is read by use of the scanner 11A on the feed-in conveyor 21A, the distribution conveyor 31A is controlled to feed the article on the distribution conveyor 31A to the stock conveyor 51A when the article on the second feed-in conveyor 21A-2 is moved onto the distribution conveyor 31A.

When the article is fed to the stock conveyor 51A by the distribution conveyor 31A, the third sensor S3A is turned on. Then, the CPU 71 drives the stock conveyor 51A for a preset period of time (which is longer than time required for the article moved on the stock conveyor 51A to reach the stopper wall 53A). As a result, the article is fed into between the stopper wall 53A and the gate 52A and then stocked there.

When the article on the first feed-in conveyor 21A-1 has reached a position of the sensor S0A and if an article is present on the second feed-in conveyor 21A-2, the first feed-in conveyor 21A-1 is kept stopped until the article on the second feed-in conveyor 21A-2 is fed out therefrom. Further, when the article on the second feed-in conveyor 21A-2 has reached a position of the first sensor S1A and if an article is present on the distribution conveyor 31A, the second feed-in conveyor 21A-2 is kept stopped until the article on the distribution conveyor 31A is fed out therefrom.

Thus, after the reading operation for all of the articles is completed, the customer depresses the stop switch 16A. Then, the CPU 71 clears the read article file 86 and stops the conveyors 21A, 31A and 41A. After this, the customer goes to the settlement section 1. Then, the operator at the settlement section 1 settles the accounts of articles registered for the customer.

At this time, if articles are stocked in the stock section 50A, the operator directly takes out the stocked article, uses the touch scanner 94 to read the bar code of the article while confirming the customer's agreement, and then puts the article in the packaging section 50A. That is, the article is additionally registered.

However, if a large number of articles are stocked or if heavy articles are stocked and it is difficult to take out the article, the gate 52A is opened. Then, the CPU 71 drives the stock conveyor 51A and feed-out conveyor 41A and then stops the conveyors 51A and 41A when the fourth sensor S4A is turned on. As a result, the article stocked in the stock section 50A is fed from the stock conveyor 51A to the feed-out conveyor 41A and then stopped when it has reached a portion just beside the settlement section 1. Therefore, the operator takes up the article which has reached the portion just beside the settlement section 1 and uses the touch scanner 94 to read the bar code of the article while confirming the customer's agreement and then puts the article into the packaging section 60A.

In the settlement, the printer 96A is driven to issue a receipt of the registered articles and the operator hands it over to the customer and receives money. After the settlement, the customer goes to the packaging section 60A and puts the articles into a packaging bag.

Therefore, according to this embodiment, each time the article code of an article is read by the scanner 11A or 11B, article data of an article corresponding to the article code is read out from the article data file 85 and stored into the read article file 86. At the same time, when the weight of a first one of the articles fed by the feed-in conveyor 21A or 21B is measured by the weighing scale 22A or 22B, it is checked whether or not the same weight data as the weight data of the article measured by the weighing scale 22A or 22B is present in the read article file 86. If the same weight data is present, the measured article is fed to the feed-out conveyor 41A or 41B. If the same weight data is not present, the measured article is stocked in the stock section 50A or 50B. In this way, even if the same weight data is not present, the reading operation for a next article can be continuously effected and therefore the reading operation can be efficiently effected.

That is, even when the bar code cannot be correctly read because the customer is not accustomed to the reading operation or even when the bar code cannot be read because the bar code is damaged or stained, the reading operation for the next article can be continuously effected so that the reading operation can be efficiently effected. Further, the article data items of articles whose bar codes are read are maintained in read article file 86, the articles can be correctly registered even if the articles are fed in an order different from the order in which the articles are subjected to the reading operation.

Further, when it is detected from transaction time data that the article data is kept stored for a preset period in the read article file 86, this article data is deleted along with the transaction time data.

Therefore, it is possible to quit purchasing articles whose bar codes are already read. In addition, if the article data of an article is deleted along with is transaction time data and another article of the same weight is put on the feed-in conveyor, the article on this conveyor is fed to the stock section. Accordingly, it is possible for the operator to find that a stocked article is different from the article whose bar code is read. If checking of such an operation is not required, the transaction time data may not be added to the article data. Further, the read article file 86 may be cleared by the start switch 15A, in place of the stop switch 16A.

In each of the above embodiments, the operation of checking whether or not the article fed by the feed-in conveyor 21A or 21B is coincident with the article read by the scanner 11A or 11B is effected by comparing the weight data previously stored for respective articles with actual weight data measured by the weighing scale 22A or 22B, but the checking operation for checking whether or not the articles are coincident with each other is not limited to the above method. For example, the checking operation can be attained by storing shape data for respective articles, measuring the shape of an article on the feed-in conveyor 21A or 21B, and then comparing the measured shape data with the stored shape data.

When every article is packaged in a box, line-photosensors can be used to detect the lengths of an article in the feeding direction and the vertical direction while the article is fed by a feed-in convyor. The line-photosensor is constituted by a light-emitting section disposed on one side of the feed-in conveyor and a light-receiving section disposed on the opposite side of the feed-in conveyor. The light-emitting section has light-emitting elemnts vertically arranged in one row, and the light-receiving section has light-receiving elements vertically arranged in a row. Each of the light-receiving elements receives a light-beam emitted from a corresponding one of the light-emitting elements. Th length in the vertical direction is detected from the pitches of the light beams and the number of light beams interrupted by an article passing the line-photosensor. The length in the forward direction is detected from the feeding speed and the period in which the light-beams are interrupted by the article passing the line-photosensor. Three- dimensional data of articles dealt with the store are preset in a memory. An item of data is read out from the memory in accordance with the article code of an article read by a scanner, in order to determine the maximum lengths of the articl in the vertical direction in the forward direction. When the lengths in the vertical direction and the forward direction are actually measured, it is checked whether or not these lengths are shorter than or equal to the maximum lengths. If yes, it is confirmed that an article whose article code is read is coincident with an article whose lengths in the vertical direction and the forward direction are measured.

Claims

1. A checkout apparatus comprising:
    a first checkout lane (2A) having reading means (10A) for reading article codes of articles, and article receiving means (20A, 30A, 40A, 50A, 60A) for receiving the articles whose codes have been read by said reading means (10A); and
    a single settlement means (70) for performing a first settlement process on the article codes read by the reading means (10A) of said first checkout lane (2A);
    characterized in that
    said checkout apparatus further comprises a second checkout lane (2B) having reading means (10B) for reading article codes of articles, and article receiving means (20B, 30B, 40B, 50B, 60B) for receiving the articles whose codes have been read by the reading means (10B) of said second checkout lane (2B); and
    said settlement means (70) is disposed between said first and second checkout lanes (2A, 2B), and provided for commonly performing the first settlement process and a second settlement process on the article codes read by the reading means (10B) of said second checkout lane (2B).

2. A checkout apparatus according to claim 1, characterized in that said article receiving means includes feeding means (21A, 31A, 41A, 51A; 21B, 31B, 41B, 51B) for feeding articles placed thereon.

3. A checkout apparatus according to claim 2, characterized in that said article receiving means further includes table means (60A; 60B) for stocking the articles fed by said feeding means (21A, 31A, 41A, 51A; 21B, 31B, 41B, 51B).

4. A checkout apparatus according to claim 1, characterized in that said article receiving means includes table means (60A; 60B) for stoking the articles placed thereon.

5. A checkout apparatus according to claim 1, characterized in that said first and second checkout lanes (2A, 2B) are parallel to each other.

6. A checkout apparatus according to claim 1, characterized in that said settlement means (70) is set back from the reading means (10A, 10B) of said first and second checkout lanes (2A, 2B) to a down stream side.

7. A checkout apparatus according to claim 1, characterized in that said settlement means is a cash register (70) having keyboard means (91) for entering various commands and data, drawer means (93) for receiving cash, and control means (71, 72, 73, 74, 75, 77) for controlling the keyboard means (91) and the drawer means (93), and at least one of said keyboard means, said drawer means, and said control means is provided commonly for said first and second settlement processes.

8. A checkout apparatus according to claim 7, characterized by further comprising an operator space defined between said first and second checkout lanes (2A, 2B) in front of said cash register (70).

F I G.   1

F I G. 2

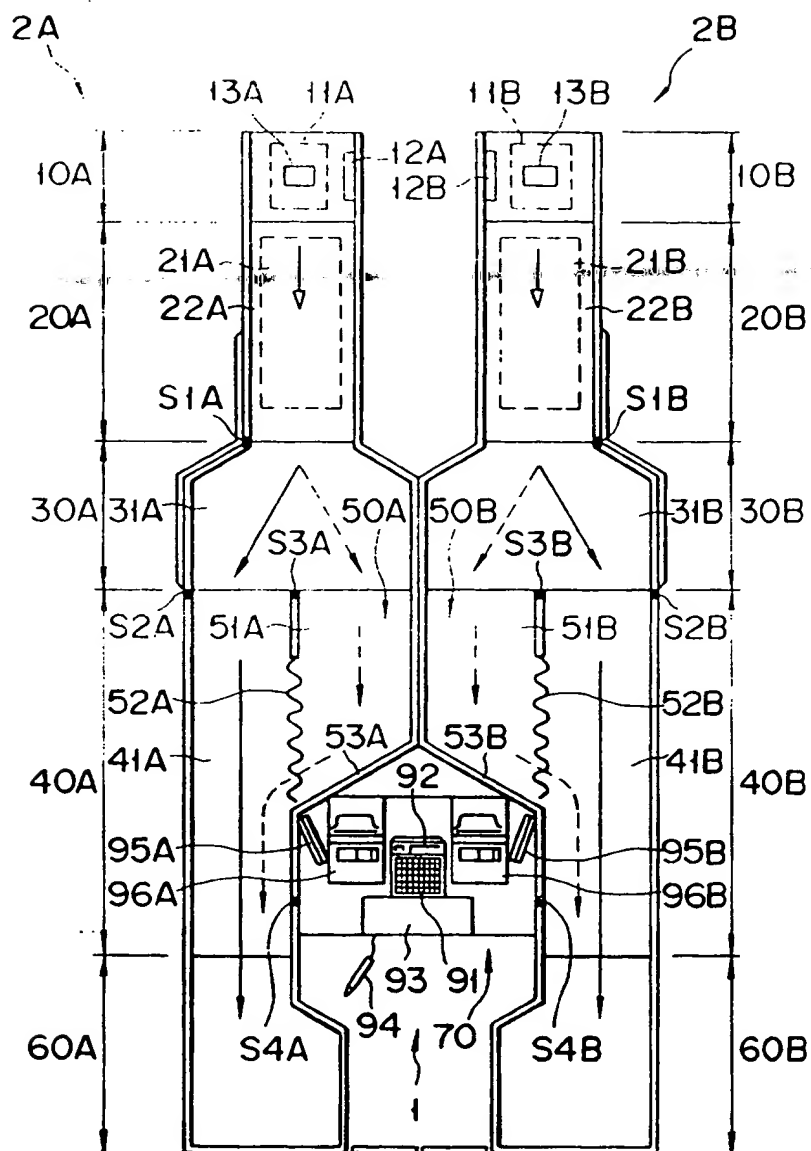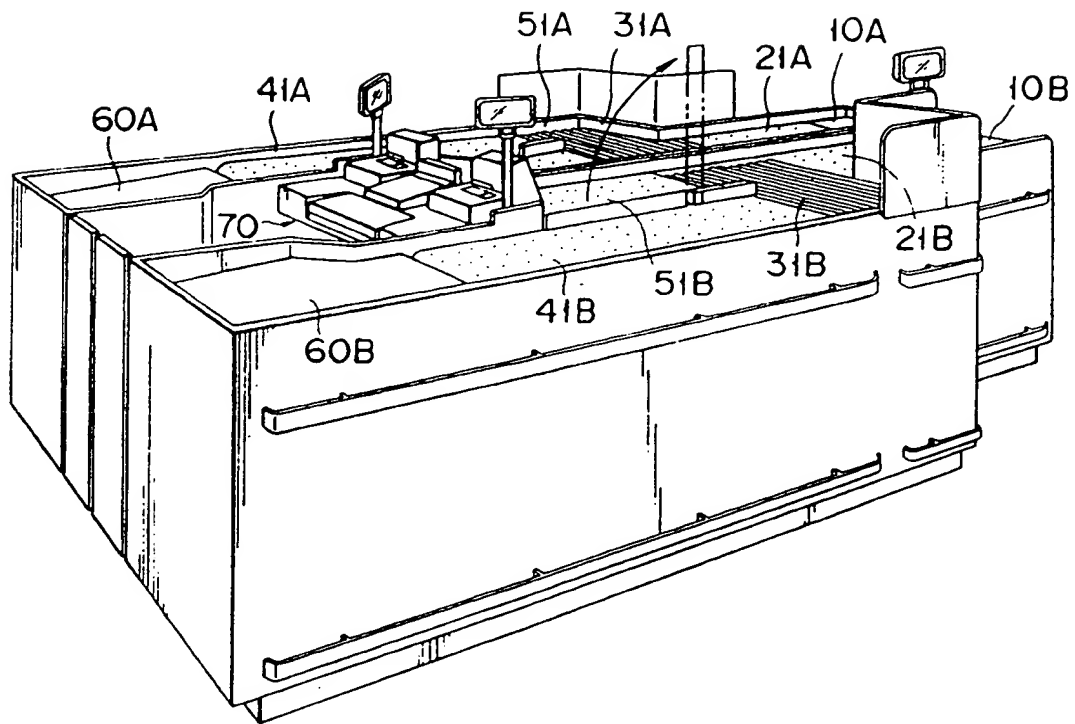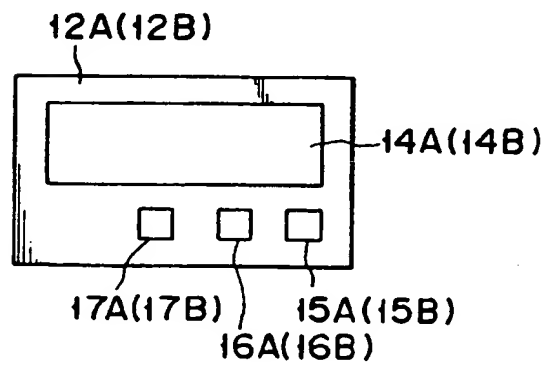F I G. 3
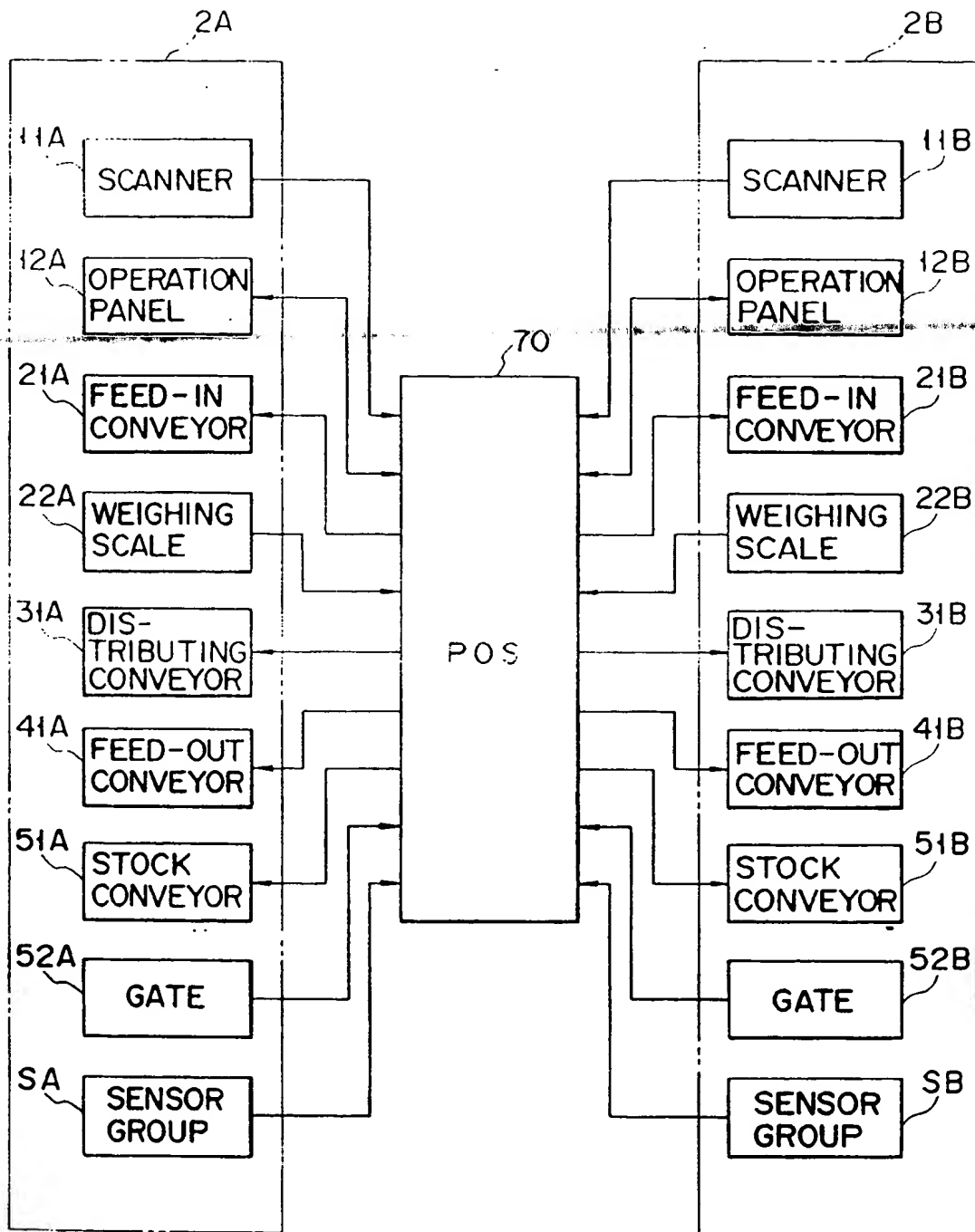
F I G. 4
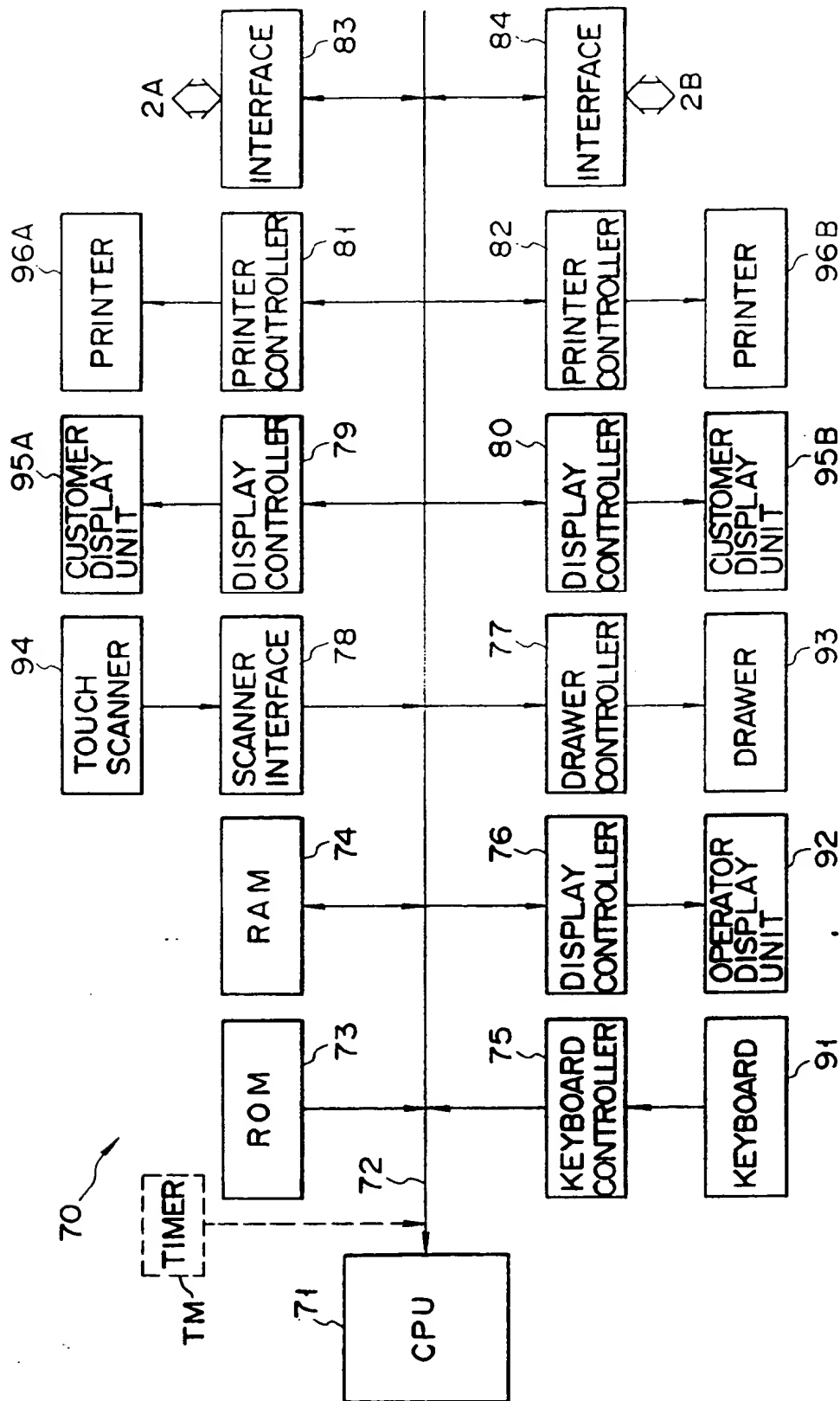
F I G. 5

85

CODE	ARTICLE NAME	UNIT PRICE	WEIGHT

F I G.   6
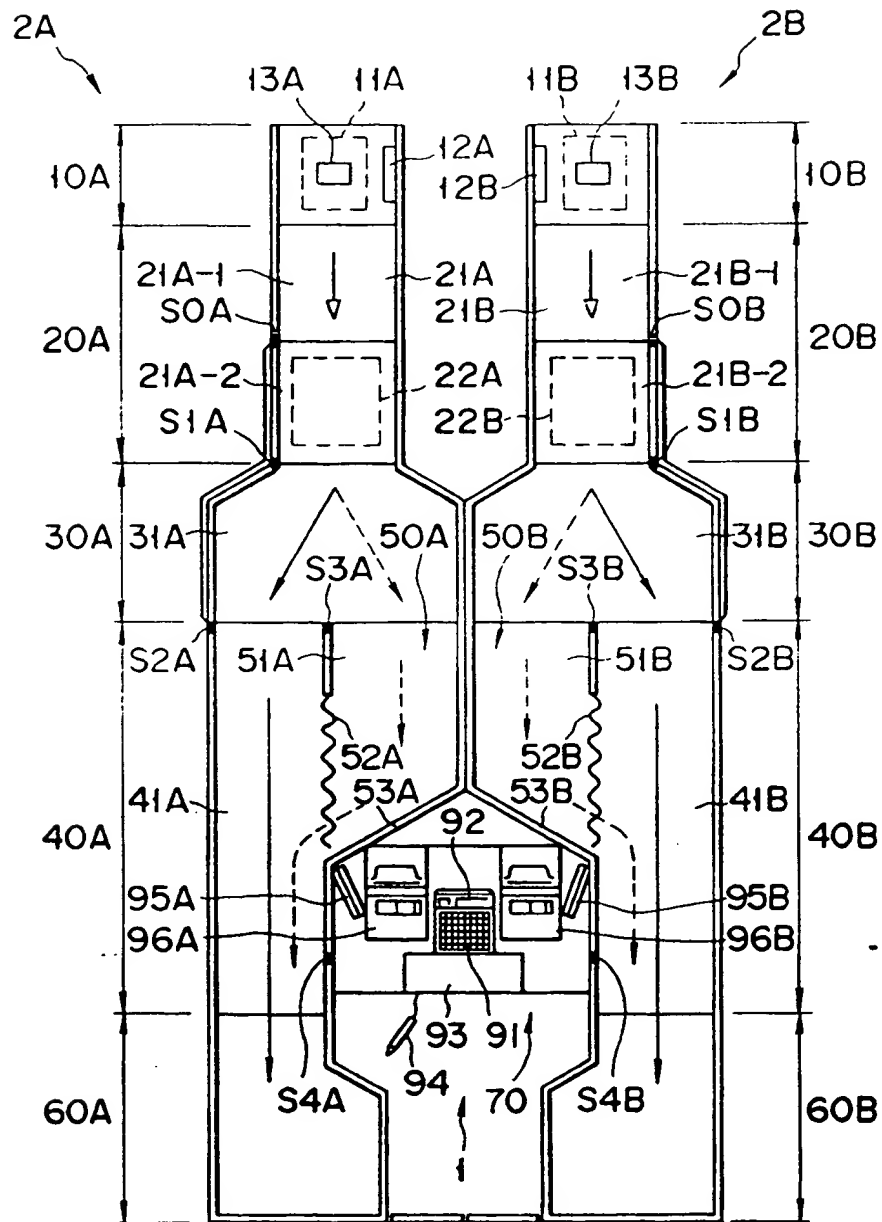
F I G. 7

85

CODE	ARTICLE NAME	UNIT PRICE	WEIGHT

F I G. 8

86

CODE	ARTICLE NAME	UNIT PRICE	WEIGHT	TRANSACTION TIME

F I G. 9
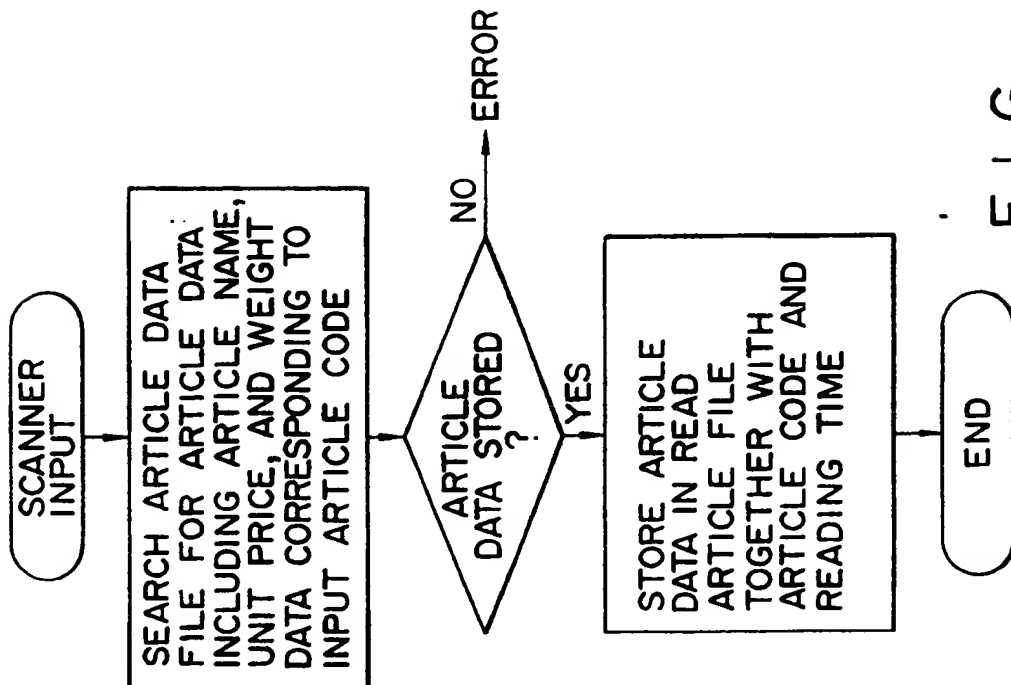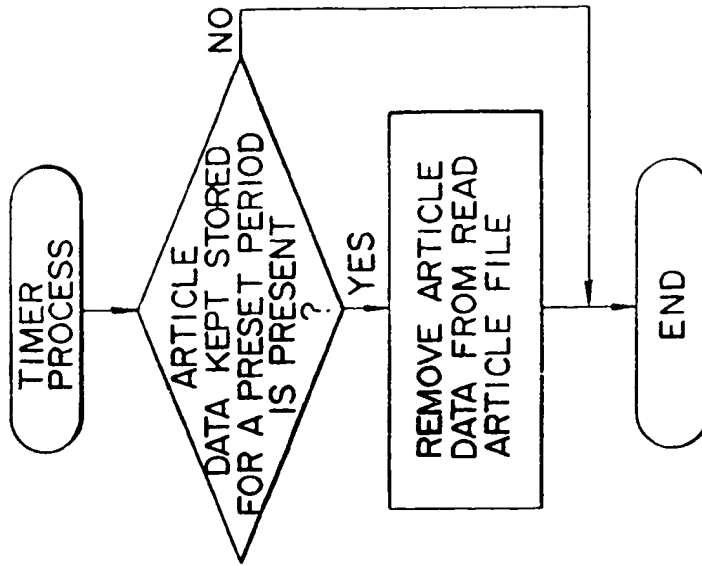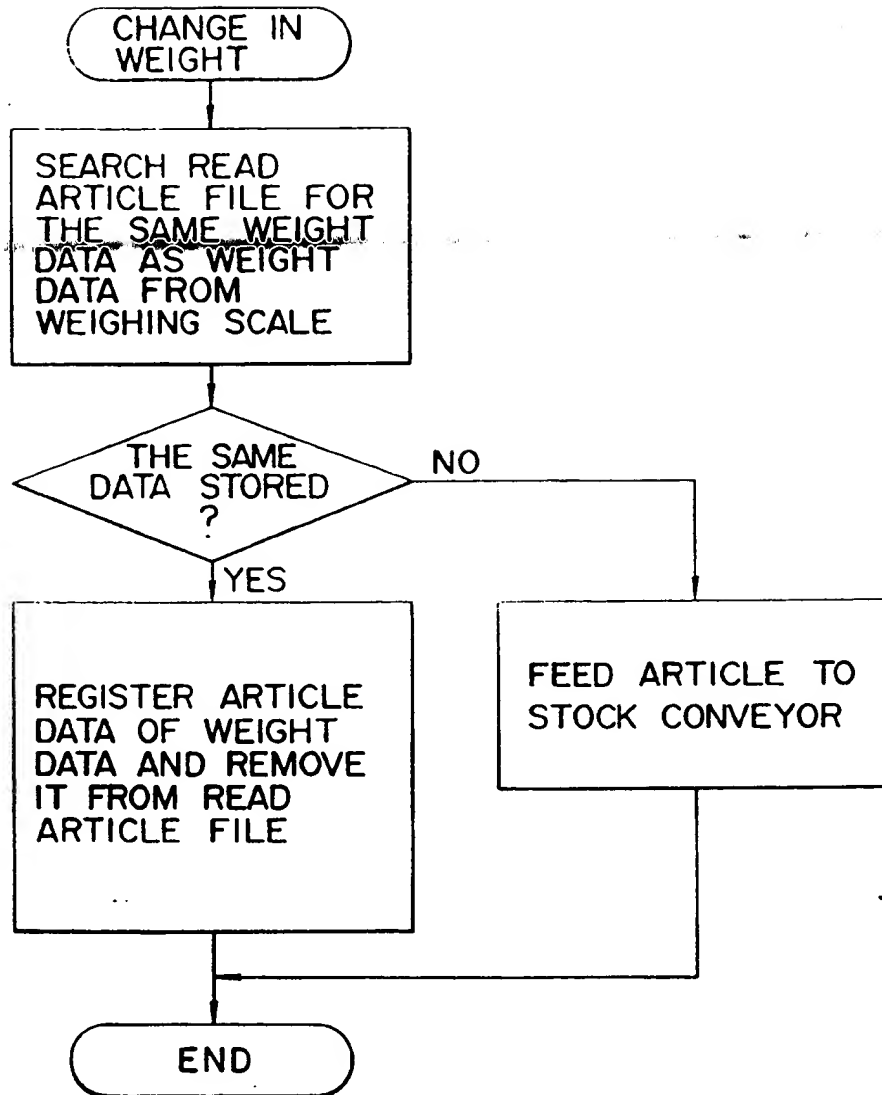
TIMER
PROCESS

ARTICLE
DATA KEPT STORED
FOR A PRESET PERIOD
IS PRESENT
?

NO

YES

REMOVE ARTICLE
DATA FROM READ
ARTICLE FILE

END

F I G. 11

SCANNER
INPUT

SEARCH ARTICLE DATA
FILE FOR ARTICLE DATA
INCLUDING ARTICLE NAME,
UNIT PRICE, AND WEIGHT
DATA CORRESPONDING TO
INPUT ARTICLE CODE

ARTICLE
DATA STORED
?

NO

ERROR

YES

STORE ARTICLE
DATA IN READ
ARTICLE FILE
TOGETHER WITH
ARTICLE CODE AND
READING TIME

END

F I G. 10

F I G. 12

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	CH-A-434 633 (FRITZ AEBERHARD) * the whole document *	1-8	G07G1/00 A47F9/04
X	US-A-4 114 727 (JOSELOFF) * column 4, line 22 - column 5, line 22; claims 1,2; figure 1 *	1-5,7,8	
X	GB-A-1 315 515 (MAYBELL MANUFACTURING) * claim 1; figure 1 *	1-5	
X	PATENT ABSTRACTS OF JAPAN vol. 2, no. 19 (E-11)8 February 1978 & JP-A-52 137 399 (FUJI DENKI SEIZO K.K.) 16 November 1977 * abstract *	1-8	
A	FR-A-1 349 095 (CHRISTIAN BÖTTCHER) * claim 1; figures 1,2 *	1-8	
A	GB-A-1 447 574 (PLESSEY COMPANY LTD.) * claims; figures 1,2 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
P,X	WO-A-90 13873 (TRINICS AB) * claims 1-7; figures 1,6 *	1	G07G A47F
P,X	EP-A-0 403 670 (SIEMENS NIXDORF) * abstract; figure 1 *	1	
A	BE-A-899 019 (AGEMETAL)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 November 1993	GUIVOL, O

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